

will in the near future supply the data necessary to enable the designer of aircraft to construct fish-form bodies of low resistance and high efficiency.

C. G. E.

LIVINGSTONE AS A MAN OF SCIENCE.

NOW, as in the year 1874, which followed his death, discussions are being carried on as to whether Livingstone was more a missionary of religion than a man of science or an enthusiastic and skilful geographer. Such contentions are a waste of argument. Livingstone ardently believed in the supreme value of Christian ethics and the power of undenominational, basic Christianity to raise the backward peoples to a happier condition of life; but to his broad mind—a mind fifty years in advance of most of its contemporaries—reasonable religion and honest science were the same thing. Most of the dogmas of his day—for which people were still being persecuted—he tacitly ignored as being either unprovable or so little essential to “true religion and undefiled” as not to be worth discussion.

If Livingstone had lived seventy years later, he would probably have sought for some science scholarship or endowment and have gone out in his religious search for knowledge as a layman, a layman of that most holy profession, the healer of disease. He had about him the making of another Darwin. As it was, he chose the path of the missionary, and fortunately selected that missionary society (the London) which had already produced men like Campbell and Moffat, and which left with its agents singular freedom of movement and judgment. Consequently, he was able to enrich science with much material for the comprehension of Africa, even when working as a missionary at a modest salary of 100*l.* a year.

No one has ever charged Livingstone with neglecting to do the work of this profession. He taught, he expounded, he translated, pleaded; and exercised a most potent influence for good over the minds of thousands of savages; impressing their chiefs, moreover, so strongly with the worth of his character and the exemplar of his own hard-working, blameless life, that he really laid firm foundations for the Christian civilisation which has now laid hold on Bechuanaland. But from the moment of landing in South Africa he stored up all the observations he could put into writing on the African flora, fauna, geology and native races.

A review of his work as a practical philanthropist, a consul and a geographer has been already dealt with by various writers during the month which preceded the centenary celebrations. Perhaps the best and the most novel treatment of these aspects of Livingstone is that given in three articles by Mr. Ralph Durand in *The African Mail*. *The British Medical Journal* has published an essay on the medical and surgical skill of Livingstone and his great ability in this profession, besides his anticipation of the modern treatment

of malarial fever and the cogency of his researches into tsetse-fly disease. To get an all-round view of the capacity of this remarkable man there only remains to be considered his quality in other branches of scientific research—philology, ethnology, zoology, botany, geology and meteorology.

In about a year after arriving in South Africa he had mastered the Sechuana language and had acquired a vehicle for conversation with the tribes between the Orange River and the Upper Zambezi, the Limpopo and Lake Ngami; for many of the Bushmen could speak some Sechuana dialect, and the conquests of the Makalolo (a Basuto tribe) had carried the Sechuana tongue northwards almost to the verge of the Congo basin. But Livingstone, appreciating the great interest which the Bantu language-family possessed for philologists, busily collected vocabularies of the still little-known languages of Ngamiland and the western Zambezi; and though these are either stored at the Grey Library at Capetown or lost, they served the purposes of Dr. W. I. Bleek in assisting him to compose his unfinished “Comparative Grammar of the South African Languages.” Ethnology owes a great debt to David Livingstone. It is impossible to write on the races of South Africa without quoting from his stores of information—information which is exact, unemotional, graphic and discerning. He wrote on the Stone Age in Central Africa before anyone had thought of such a period in negro culture; on the ancientness of pottery among the Bantu; on the domestic animals of south Central Africa; on fragments of unwritten history and half-forgotten migrations; on the importance of the Pleiades as a measurer of the seasons in the eyes of the African agricultural folk; on the racial and cultural influence of ancient Egypt on negroland.

His notes on the life-history and habits of the lion, ratel, giraffe, rhinoceros, buffalo, elephant, giant chimpanzi, baboon, hippopotamus, zebra, lechwe, situtunga, and the other striking mammals of southern and Central Africa, are strewn through his three published books, and have done good service in many a natural history book. No succeeding naturalist traveller has called his information in question. Amongst his discoveries in zoology were several antelopes and the pygmy elephant of the Congo forests, “a small variety, only 5ft. 8 in. high, yet with tusks 6 ft. 8 in. in length.” (This form was only rediscovered by the Germans a few years ago.) Livingstone’s notes on birds, lizards, snakes and frogs are as good reading and as accurate as those on mammals. His observations on the part played in the economy of nature by the termites (which consume and cover with soil all dead timber) were subsequently confirmed and elaborated by the late Prof. Henry Drummond.

Livingstone’s botanical collections and innumerable botanical notes—more especially about the Zambezi flora—are incorporated in the old and the new editions of the “Flora of Tropical Africa.” His discovery of fossil Araucarias in the rocks of the Central Zambezi valley led him to guess

at the ancient connection between South Africa, Australia and South America. His sketch of the geology of Central Africa, written in 1857, his description of the former plutonic activities of the south-west Tanganyika region, of the coal-bearing strata of the Ruvuma and west Nyasaland, and his hearsay reports of the gold and copper of Katanga have stood the test of time in their substantial accuracy. His meteorological records of the rainfall, temperature and climate of Central Africa still await publication.

Indeed, it is possible that much of Livingstone's scientific research work has never yet been published, and that when it is disinterred and printed we may find ourselves still further indebted to this missionary-consul-explorer for valuable information about the southern third of Africa.

H. H. JOHNSTON.

PLANT DISEASES AND INSECT PESTS.

MOST of the investigations on this subject are carried out at agricultural research institutions and have for their primary object the discovery of means for destroying the pest, rather than the elucidation of the relationship between the host and the parasite. Yet the latter problem must be of extraordinary interest, and we can only hope that the investigators will turn to it as soon as some of their pressing economic problems are solved.

Of the British Colonial departments, the West Indian is among the most prolific in publications on these subjects. The papers are issued in the reports of the various schools and departments and in *The West Indian Bulletin*. No. 4, vol. xii., of this journal contains papers by H. A. Ballou, J. R. Bovell, and F. W. South on the use of entomogenous fungi in combating scale insects in Barbados, one of the most interesting methods of pitting one organism against another for the benefit of mankind. Fungi parasitic on the insects are cultivated and the spores distributed: they are then applied to the insects directly these appear on the tree. The authors are very hopeful about the method; one, indeed, thinks it may enable most of the insect pests to be kept in check.

The bud rot of the cocoa-nut palm, described by J. B. Rorer in another paper, is an interesting example of a bacterial disease of plants. The disease has been much studied in the United States by Johnston (Bull. 228, U.S. Dept. of Agriculture), who comes to the remarkable conclusion that it is caused by *Bacillus coli*.

The United States Department of Agriculture and the entomological laboratories of the various colleges are, however, by far the most active investigators of plant diseases and insect pests. From the department itself issues a continuous stream of publications which we cannot pretend adequately to review. A. L. Quaintance has recently, in Circular 154, described the leaf blister mite (*Eriophyes pyri*, Pagenstecher), one of the smallest animals (they are not true insects)

attacking horticultural crops. H. M. Russell, in Circular 151, deals with the greenhouse thrips (*Heliothrips haemorrhoidalis*, Bouché), which does considerable damage in attacking ornamental plants. E. S. Tucker, in Circular 152, describes the rice water-weevil (*Lissorhoptrus simplex*, Say), the larvæ of which feed on the roots of rice plants, while the adult weevils cause some harm by feeding on the rice leaves; altogether, this insect is regarded as the most serious enemy of rice in the southern States.

The Hawaiian Station has issued an account of Dr. Lyons's investigation of the curious sugarcane disease known as *iliau*, endemic in the island and not known elsewhere. He traces it to a fungus producing two types of fruiting bodies: a perfect form belonging to the genus *Gnomonia* and an imperfect form referable to the genus *Melanconium*; he proposes to call it *Gnomonia iliau*.

NOTES.

THE ninth International Congress of Zoology now sitting at Monaco, under the presidency of H.S.H. the Prince of Monaco, was opened on Tuesday at the Oceanographical Museum. There are seven sections and one subsection, as follows:—(1) Comparative Anatomy and Physiology; (2) Cytology and General Embryology; (3) Systematic Zoology; (4) General Zoology, Palæozoology, and Zoogeography; (5) Oceanographical Zoology and Plankton; (6) Applied Zoology, Parasitology, and Museums; (7) Zoological Nomenclature; subsection, Entomology. Every consideration for the convenience and comfort of members has been given. The sections meet in the Oceanographical Museum and Lyceum, close by. The common subject of conversation of members is concerning zoological nomenclature; we learn that there have been several preliminary unofficial meetings, and that proposals are forthcoming which will probably result in a decision satisfactory to zoologists in general. The Prince of Monaco opened the proceedings on Tuesday at 6 p.m., after which there was a reception in the museum. The programme shows that there are many and interesting communications. British membership on the opening day exceeds eighty out of a total of 723, the largest yet recorded for any international zoological congress. There is, however, not a proportionate number of British communications; those on the list on Monday were by Prof. Elliot Smith, of Manchester; Prof. J. Arthur Thomson, of Aberdeen; Dr. R. F. Scharff, of Dublin; Mr. E. Hall, of London; Dr. E. J. O. Hartert, of Tring; Dr. W. S. Bruce, of Edinburgh; Dr. M. Annandale and Dr. B. L. Chandhuri, of Calcutta; Dr. R. J. Anderson, of Galway; and Dr. Hornell, of Madras. Lord Walsingham will move an important resolution on zoological nomenclature, and among British members who are likely to take part in this discussion are Dr. S. F. Harmer and the Hon. Walter Rothschild.

EXCEPTIONALLY wild and stormy weather was experienced over the south of England on Saturday, March 22. A severe thunderstorm occurred in the